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(11) Publication number:

0 541 173 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 92203379.0

(51) Int. Cl.⁵: A01D 45/02

(22) Date of filing: 03.11.92

(30) Priority: 05.11.91 NL 9101845

NL-5667 KP Geldrop(NL)

(43) Date of publication of application:
12.05.93 Bulletin 93/19

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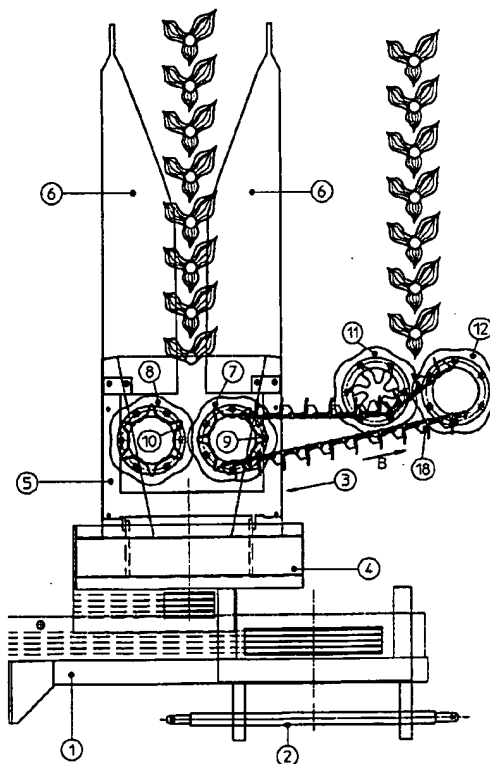
(94) Designated Contracting States:
AT CH DE ES FR LI NL PT

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(54) A maize chopper.

(57) The invention relates to a maize chopper provided with a frame, with at least two co-operating main cutting means (7,8) which are rotatably journaled in the frame (5) about upwardly extending axes of rotation, and with feed members (9,10), which are disposed above the main cutting means (7,8) and which rotate along with said main cutting means during operation, for transporting the crop in the direction of a chopping chamber (4), in which a chopping mechanism for chopping the fed-in crop is disposed. The device is at at least one side equipped with an add-on device, which is provided with at least two additional co-operating auxiliary cutting means (11,12), which are coupled to one of the main cutting means (7) by a chain (18) provided with carriers (21). Crop cut by the auxiliary cutting means (11,12) is transported by the chain (18) along the rear side of a carrier wheel (14) provided above the auxiliary cutting means (11) located closest to the main cutting means (7,8) and introduced into the space between the feed members (9,10) located above the main cutting means (7,8), so as to be fed to the chopping mechanism.



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The invention relates to a maize chopper provided with a frame, with at least two co-operating main cutting means, which are rotatably journaled in the frame about upwardly extending axes of rotation, and with feed members disposed above the main cutting means and rotating along with said main cutting means during operation, said feed members being provided with carriers for transporting the crop in the direction of a chopping chamber containing a chopping mechanism for chopping the feed-in crop.

Such a device is in particular designed for processing crop grown in rows, such as maize stalks, which are for example cut by the main cutting means one row at a time and chopped by means of the chopping mechanism.

In practice there is a need to provide a possibility, proceeding from such a basic design of a maize chopper, to harvest more rows of crop arranged one beside the other simultaneously than the number of rows for which the machine was originally designed.

According to the invention this can be achieved in that the device is at at least one side equipped with an add-on device, which is provided with two additional co-operating auxiliary cutting means, which are coupled to one of the main cutting means by a chain provided with carriers, all this in such a manner that crop cut by the auxiliary cutting means during operation is transported by the chain along the rear side of a carrier wheel provided above the auxiliary cutting means located closest to the main cutting means, said carrier wheel having recesses for receiving crop stalks and being driven by said chain, and introduced into the space between the feed members located above the main cutting means, so as to be fed to the chopping mechanism.

When using the construction according to the invention, taking a maize chopper which in use is suitable for cutting and chopping one or more rows of crop in one operation as a starting point, it is easily possible, by adding the add-on device, to obtain a device which is suitable for simultaneously cutting and chopping extra rows of crop stalks. It will be apparent that in the first place this offers advantages from a manufacturing point of view, since it is possible, taking a single basic type of maize chopper as a starting point, to supply maize choppers with varying capacities, whilst this is also advantageous for the buyer, since he will likewise have a possibility of changing the capacity of the maize chopper he purchased at a later date, should he wish to.

The device is furthermore particularly suited for harvesting randomly planted crops. In this respect it will be advantageous when the auxiliary cutting means are adjustable transversely to the intended

direction of movement of the maize chopper, and capable of being arranged closely together.

It is noted that from German Patent Application No. 3,623,380 a maize chopper is known which is provided with a cutter bar extending transversely to the intended direction of movement during operation. Two conveying means are arranged behind said cutter bar, each comprising a pair of drums and a conveyor chain passed over said drums for transporting the cut-off stalks around said drums to the chopping mechanism.

From said reference it cannot be derived, however, that it is possible to extend the capacity of a maize chopper by adding an add-on device and accordingly the construction of said known maize chopper is entirely different from that of a maize chopper equipped with an add-on device according to the invention.

The invention will be explained in more detail hereafter with reference to a few possible embodiments of the construction according to the invention diagrammatically illustrated in the accompanying Figures.

Figure 1 is a diagrammatic plan view of an embodiment according to the invention.

Figure 2 is a diagrammatic plan view of the machine shown in Figure 1, in a second operating position.

Figure 3 is a larger-scale plan view of a pair of auxiliary cutting means and a chain co-operating therewith.

Figure 4 is a sectional view of a carrier wheel located above an auxiliary cutting means, the chain co-operating therewith and guide means for said chain.

Figure 5 is a plan view of a part of the chain shown in Figure 4.

Figure 6 is a side view of Figure 5.

Figure 7 is a diagrammatic plan view of a second embodiment of a device according to the invention.

Figure 8 is a plan view corresponding with Figure 7, wherein the maize chopper is shown in another operating position.

Figure 9 is a diagrammatic plan view of a further embodiment of an add-on device according to the invention.

The maize chopper diagrammatically shown in Figures 1 and 2 comprises a first frame part 1, which is provided with a coupling member 2, by means of which the maize chopper can be coupled to the power lift of a tractor or the like in the usual manner.

The frame part 1 is coupled to a further frame part 3, so as to be pivotable about a vertically extending pivot axis (not shown), said frame part 3 comprising a casing 4, in which a chopping wheel is accommodated in a usual manner. Furthermore

the frame part 3 comprises a frame 5 coupled to the casing 4. Crop guides 6 are secured to the side of the frame 5 remote from the casing 4.

Furthermore the frame 5 supports two co-operating disc-shaped main cutting means 7 and 8, above which drum-shaped feed members 9 and 10 are located, said feed members being provided with projecting ribs forming carriers, as will be apparent from Figures 1 and 2.

During normal operation the frame parts 1 and 3 will occupy the position shown in Figure 2, wherein the device can be moved across the field, in the direction according to the arrow A, by means of a tractor or the like, in order to cut off maize stalks present on the field by way of the main cutting means 7 and 8, whereupon said stalks are moved towards the rear by means of the feed members 9 and 10, in the direction of a feed opening provided in the casing 4. The maize stalks or the like introduced into the casing in this manner are chopped by the chopping wheel and discharged in a usual way into a trailer driving along the chopper.

For transport behind the tractor the two frame parts 1 and 3 can be brought into the position shown in Figure 1 with respect to each other.

The construction and the operation of such a maize chopper provided with two main cutting means and drum-shaped feed members located thereabove is generally known, accordingly it will not be necessary to describe or illustrate the construction of this known maize chopper in more detail herein.

In practice, however, there is frequently a need to extend the working width of such a standard maize chopper, so that several rows of crop can be simultaneously cut and chopped in one operation.

According to the invention this can be achieved in that use is made of at least two additional disc-shaped auxiliary cutting means 11 and 12, which are supported on a frame beam (not shown) so as to be rotatable about vertical axes of rotation, said frame beam preferably being detachably secured to the side of the frame 5.

A chain wheel 13, which is fixedly connected to the auxiliary cutting means 12, is located above the auxiliary cutting means 12 located furthest away from the two main cutting means 7 and 8.

A chain wheel 14, which is connected to the auxiliary cutting means 11, is located above the auxiliary cutting means 11 located closest to the two main cutting means 7 and 8.

As appears from Figures 3 and 4 said chain wheel 14 is built up of a hub part 15 and two superimposed plate-shaped members connected thereto, which are each built up of a plurality of fingers 16 being integral with each other and extending outwards from the hub-shaped member

15, said fingers bounding recesses 17 located therebetween and being open at the outer circumference of the chain wheel in question.

Above said main cutting means 7 a chain wheel is provided, said chain wheel being located between the main cutting means 7 and the feed member 9 provided above said cutting means and being connected to the main cutting means 7. An endless link chain 18 is passed over the chain wheels that are connected to the cutting means 7 and 11, said link chain also being passed along the rear side of the chain wheel 14 connected to the auxiliary cutting means 10, seen in the intended direction of movement according to the arrow A. The chain rollers thereby co-operate with projecting noses 19 provided on the ends of the fingers 16, as will be apparent from Figure 3. As is furthermore apparent from Figure 3, guide means 20 for the chain 18, extending along part of the circumference of the chain wheel 14, is provided near the chain wheel 14, said guide means ensuring that the pins of the chain 18 remain engaged with the projecting noses 19, so as to prevent undesirable slipping of the chain over the noses 19 of the chain wheel 14, as a result of which the intended timing of the drive of the fingers 16 functioning as carriers for the crop stalks would be lost.

As will furthermore be apparent from the Figures wings 21, extending above and under the chain, are secured to the links of the chain in regularly spaced-apart relationship.

A guide strip 22 is provided for the part of the chain 18 which extends between the rear side of the chain wheel 14 and the front side of the feed member 9 located above the main cutting means 7. As will furthermore be apparent from Figure 3 the end of the guide strip 22 located near the chain wheel 14 is positioned between the plate-shaped parts comprising the fingers 16, whilst the parts of the wings 21 remote from the chain are located above and under the guide strip 22 respectively.

When using a device equipped with the addition device comprising the auxiliary cutting means 11 and 12 it is possible that besides the row of crop stalks cut off by the main cutting means 7 and 8 also a further row of crop stalks is cut by way of said auxiliary cutting means 11 and 12. The cut-off stalks are carried along by the chain 18 moving in the direction according to the arrow 8, in particular by the wings 21 secured to said chain, in the direction of the chain wheel 14, whereby the stalks will be carried along by said chain wheel acting as a carrier wheel, in the interspaces between the fingers 16. As will be apparent from Figure 3 the adjustment between the chain wheel 14 and the chain 18 is such, that at the time of the passage of the chain wheel 14 the wings 21 secured to the chain 18 are at least substantially

positioned above the fingers 16 of the chain wheel, so that the cut-off crop stalks can be received in the recesses 17 without impediment.

Then the stalks are passed between the chain and the guide strip 22 and about part of the feed member 9, in the direction of the passage present between the feed members 9 and 10, so as to be passed, together with the stalks cut off by the main cutting means 7 and 8, in the direction of the casing 4 comprising the chopping mechanism.

Since the end of the guide strip 22 is located between the superimposed fingers 16, crop stalks received in the recesses 17, which might tend to become wedged in the recesses 17, will be forced from the recesses.

From the above it will be apparent that the working width of the maize chopper can be doubled by making use of a simple add-on device, which is to be attached to the side of the device.

As is diagrammatically shown in Figure 7 add-on devices may be attached to either side of the standard maize chopper, if desired, said add-on devices being provided with auxiliary cutting means 11, 12 and 11', 12' respectively and with the further associated means required for the correct operation of the respective add-on devices, whereby the construction and operation of said means will be apparent from the above description of the first embodiment.

As is furthermore illustrated in Figure 8 the construction may be such that an add-on device is adjustable transversely to the intended direction of movement, preferably being pivotable about the axis of rotation of a respective main cutting means 7 or 8, which allows further applications of the device, as will be apparent from Figures 7 and 8.

As will furthermore be apparent from Figure 9 the add-on unit may comprise further auxiliary cutting means in addition to the auxiliary cutting means 11 and 12, such as the concerting auxiliary cutting means 23 and 24 arranged beside the auxiliary cutting means 11 and 12, seen in the direction of movement, for cutting off a further row of crop. The chain 18 is also passed about a chain wheel 25 thereby, in the manner shown in Figure 9, said chain wheel being connected to the auxiliary cutting means 24 and corresponding with the chain wheel 13, as well as about a chain wheel or carrier wheel 26 connected to the auxiliary cutting means 23 and corresponding with the chain wheel 14. A guide means 27 corresponding with the guide member 20 is arranged near the chain wheel 26, whilst a guide strip 28 corresponding with the guide strip 22 is provided near the cutting means 23 and 12. It will be apparent that also in this embodiment the crop stalks cut off by the two groups of auxiliary cutting means will be transported by the chain 18 in the direction of the two

main cutting means 7 and 8, from where they will be transported towards the rear between the two drum-shaped feed members 9 and 10, in the direction of the chopping mechanism.

Furthermore it will be possible to arrange crop guide means in front of the auxiliary cutting means, if desired, in order to achieve that the crop stalks, in case they are not arranged in rows, can still be effectively guided in the direction of the co-operating parts of the auxiliary cutting means arranged side by side.

In the above description of the invention a certain basic type equipped with two main cutting means was taken as a starting point. It will be apparent, however, that the principle of the invention may also be used with basic types having a larger working width and possibly being equipped with more than two main cutting means.

Claims

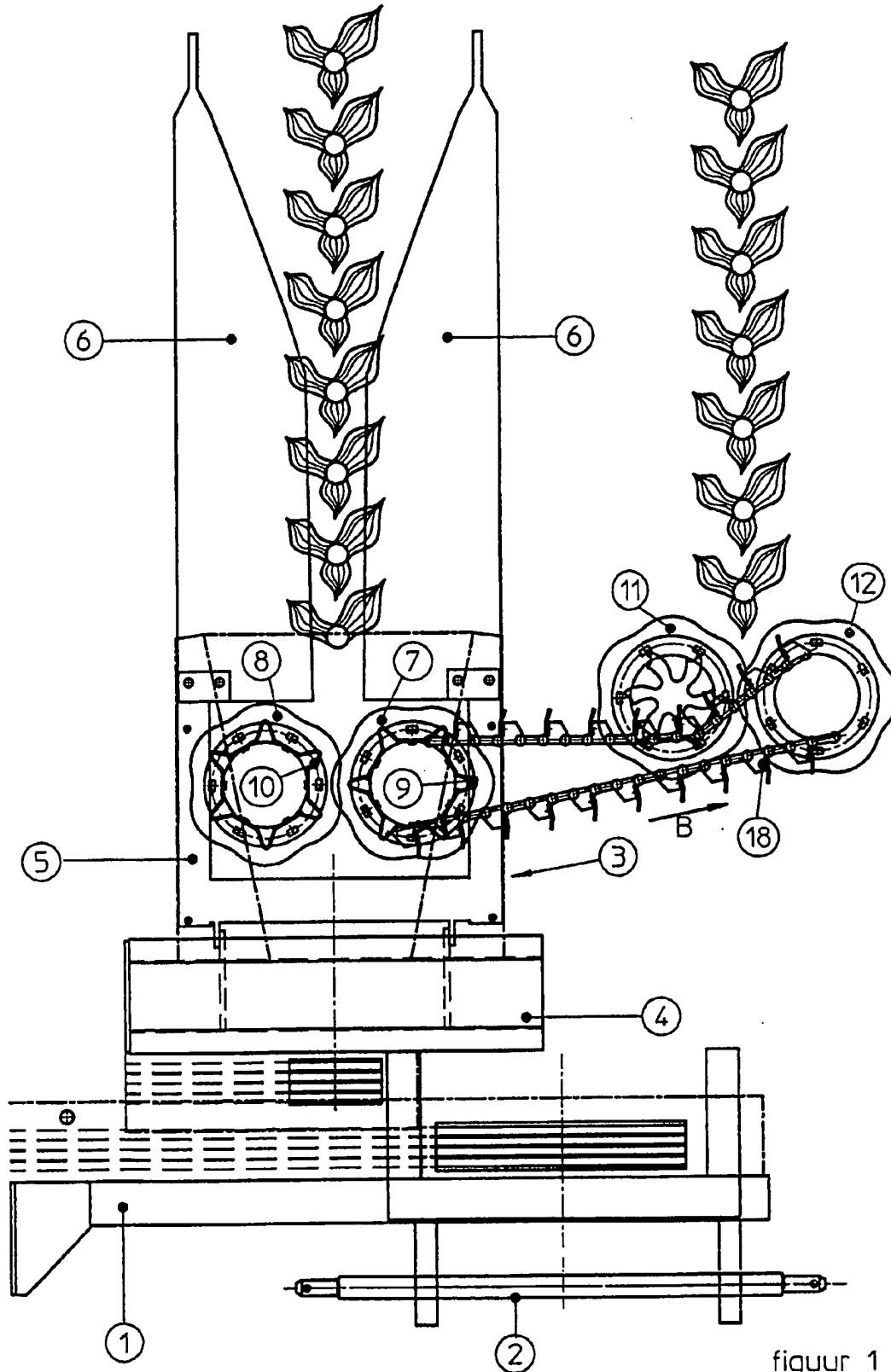
1. A maize chopper provided with a frame, with at least two co-operating main cutting means, which are rotatably journaled in the frame about upwardly extending axes of rotation, and with feed members disposed above the main cutting means and rotating along with said main cutting means during operation, said feed members being provided with carriers for transporting the crop in the direction of a chopping chamber containing a chopping mechanism for chopping the fed-in crop, characterized in that the device is at least one side equipped with an add-on device, which is provided with two additional co-operating auxiliary cutting means, which are coupled to one of the main cutting means by a chain provided with carriers, all this in such a manner that crop cut by the auxiliary cutting means during operation is transported by the chain along the rear side of a carrier wheel provided above the auxiliary cutting means located closest to the main cutting means, said carrier wheel having recesses for receiving crop stalks and being driven by said chain, and introduced into the space between the feed members located above the main cutting means, so as to be fed to the chopping mechanism.
2. A maize chopper according to claim 1, characterized in that said carrier wheel is provided with two spaced-apart, superimposed plate-shaped parts comprising protruding fingers and recesses located between said fingers.
3. A maize chopper according to claim 1 or 2, characterized in that a strickle means is pro-

vided near the place where during operation the chain moves in a direction remote from the carrier wheel.

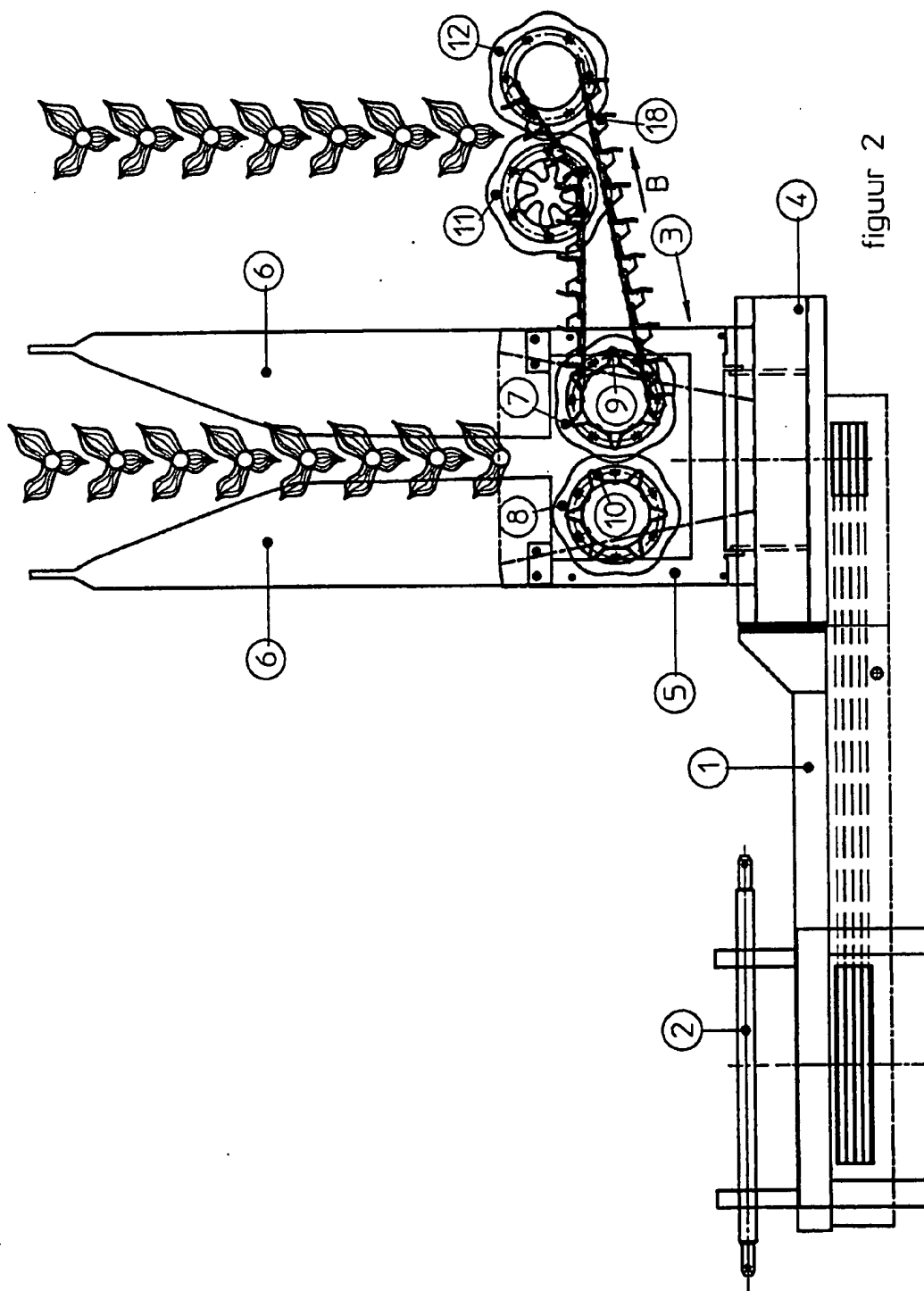
4. A maize chopper according to claims 2 and 3, characterized in that one end of said strickle means is located between the plate-shaped parts of the carrier wheel. 5
5. A maize chopper according to claim 3 or 4, characterized in that said strickle means is formed by the end of a guide means located between the plate-shaped parts, said guide means extending at least substantially parallel to the chain. 10
15
6. A maize chopper according to claim 5, characterized in that the end of the guide means remote from the carrier wheel extends along part of the circumference of a feed member located above a main cutting means. 20
7. A maize chopper according to any one of the preceding claims, characterized in that a guide means for the chain is provided near the carrier wheel, at the side remote from said carrier wheel, so as to keep the chain engaged with the carrier wheel. 25
8. A maize chopper according to any one of the preceding claims, characterized in that said chain is provided with protruding wings for carrying along the crop. 30
9. A maize chopper according to claim 8, characterized in that the construction is such that, seen in the direction of movement of the crop, the wings of the chain are located near the upstream boundary edges of the recesses in the carrier wheel at the part where the chain is in engagement with the carrier wheel. 35
40
10. A maize chopper according to claim 8 or 9, characterized in that the construction is such that the ends of said wings extend above and under the guide means extending along the chain. 45
11. A maize chopper according to any one of the preceding claims, characterized in that said auxiliary cutting means are adjustable transversely to the intended direction of movement of the maize chopper. 50
12. A maize chopper according to claim 11, characterized in that said auxiliary cutting means are adjustable about an upwardly extending axis of rotation. 55

13. A maize chopper according to claim 11 or 12, characterized in that said auxiliary cutting means are jointly pivotable about the axis of rotation of the nearest auxiliary cutting means.

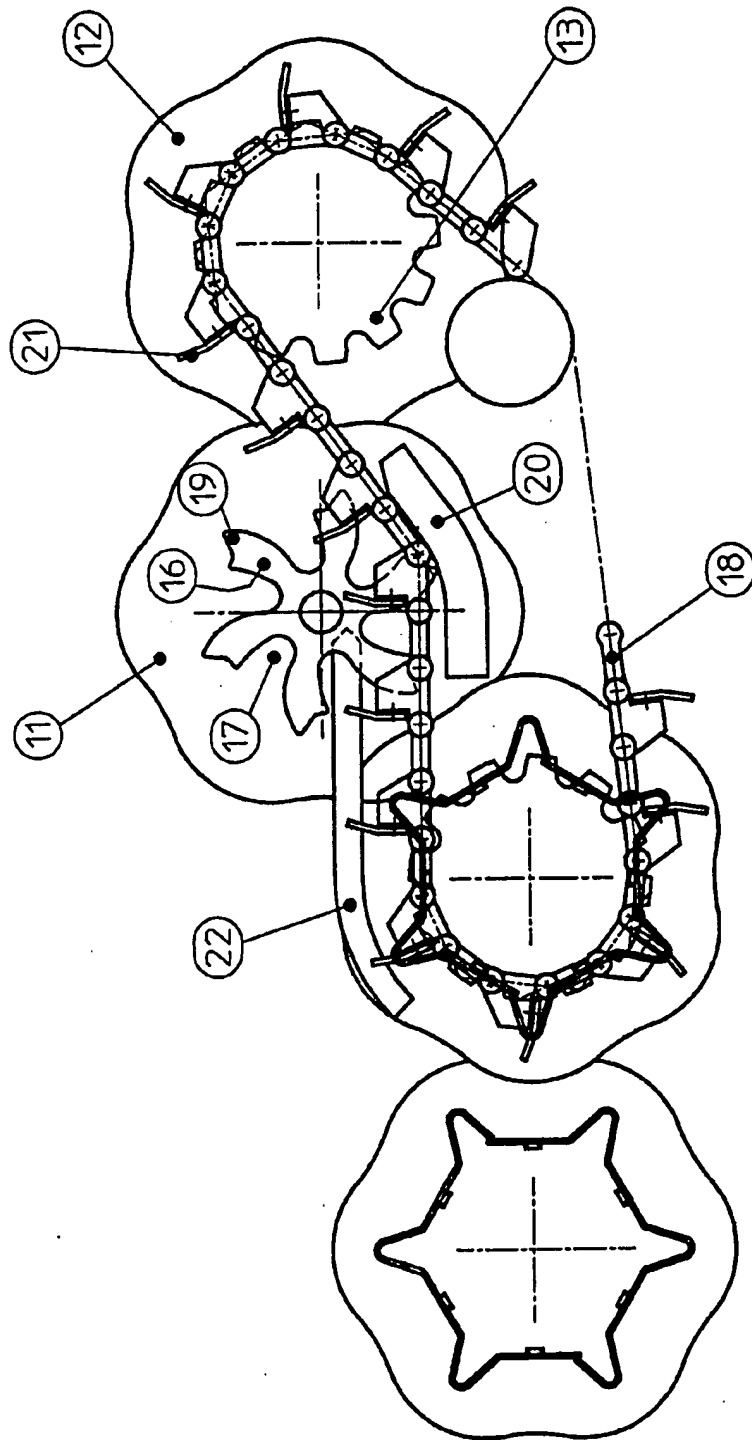
14. An add-on device obviously intended for use with a maize chopper according to any one of the preceding claims.



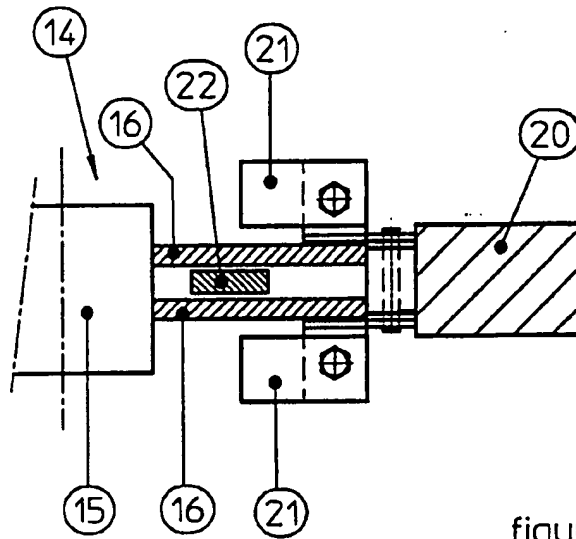
figuur 1



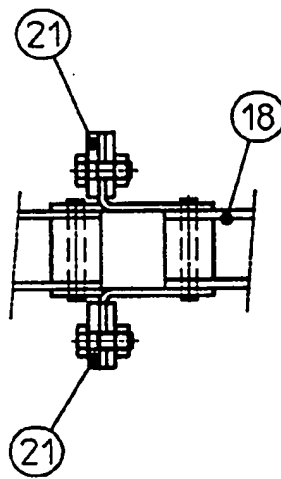
figuur 2



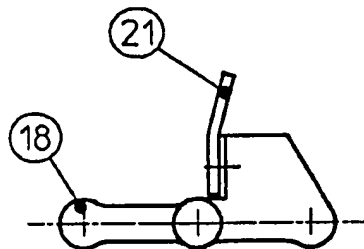
figuur 3



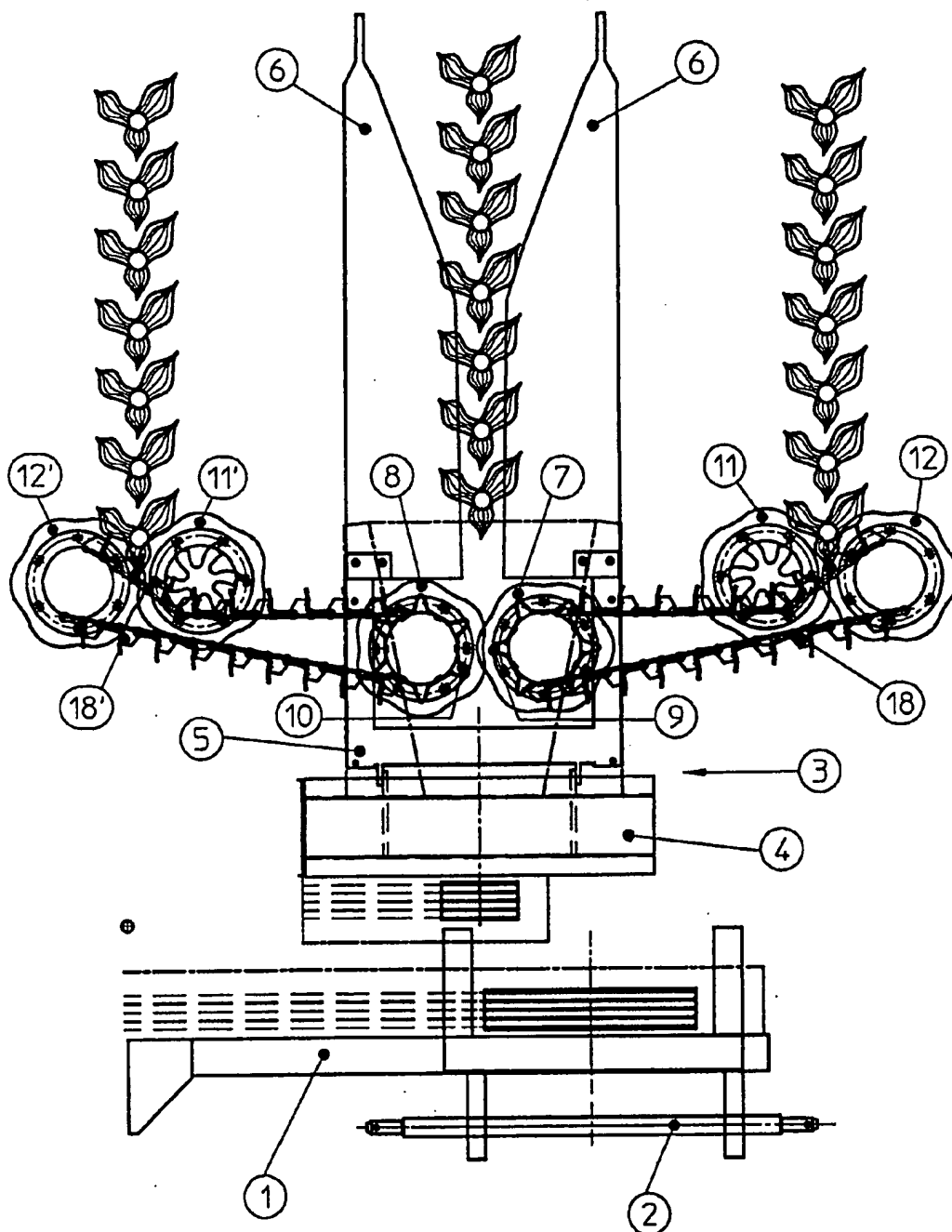
figuur 4



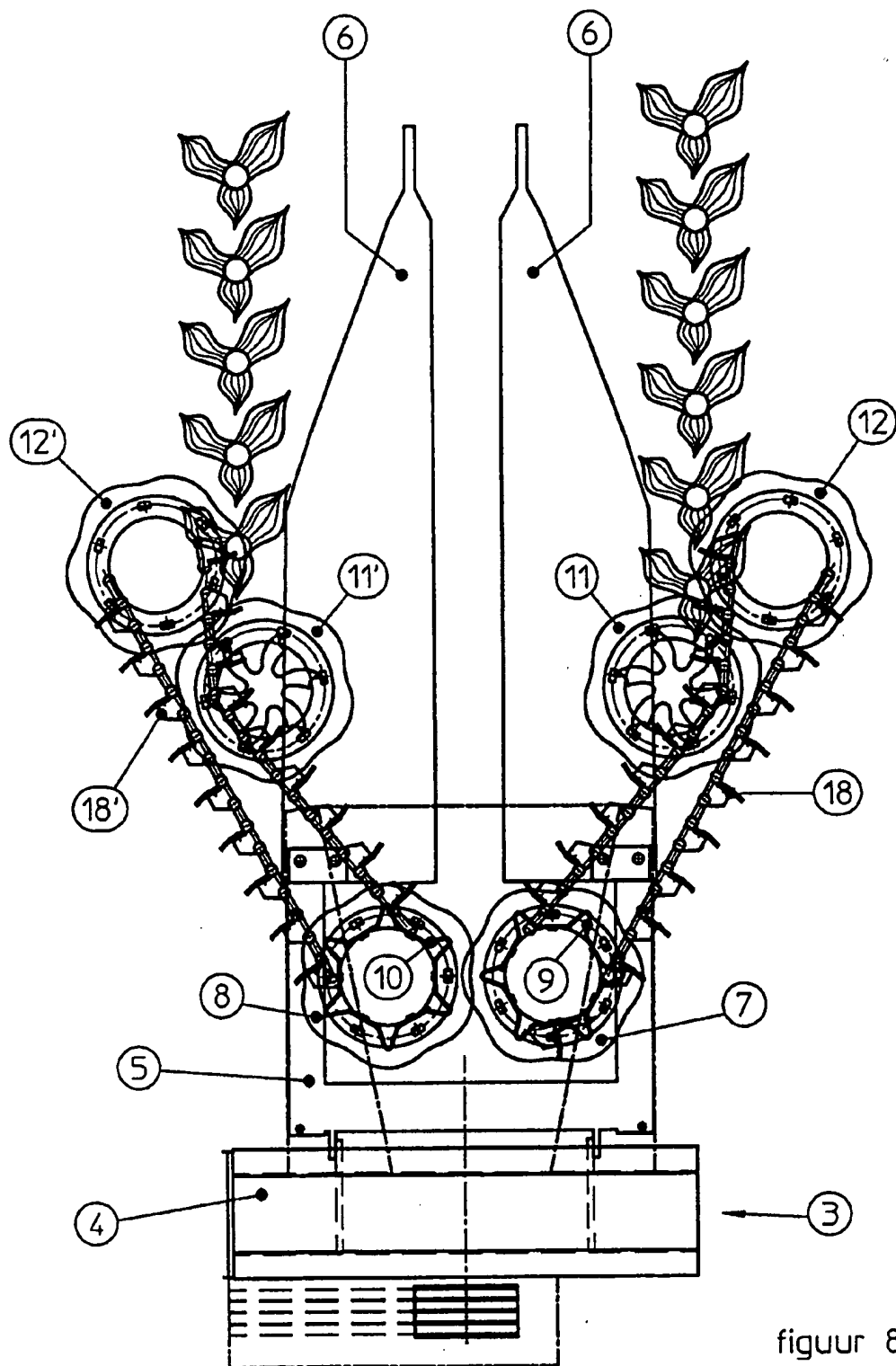
figuur 5



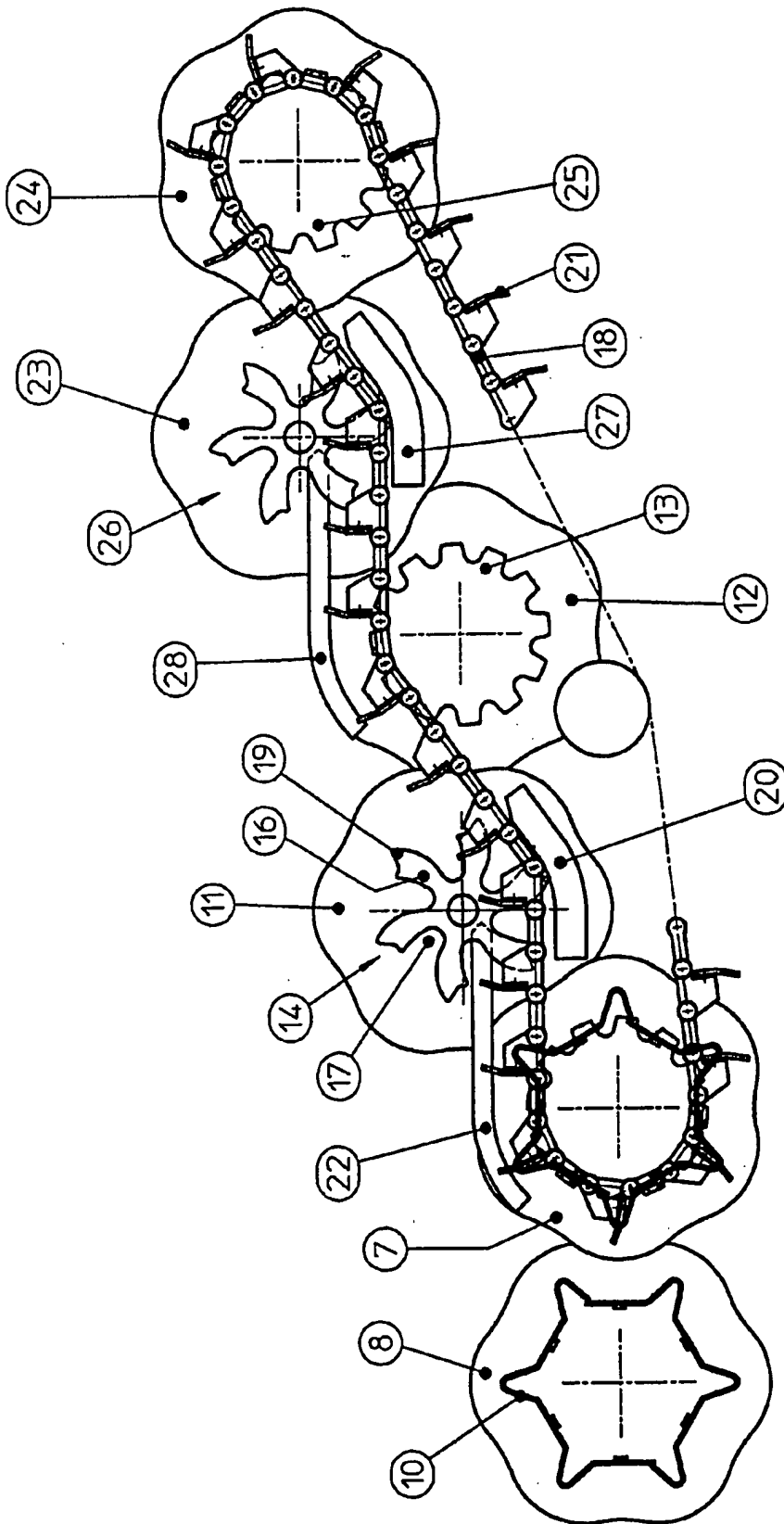
figuur 6



figuur 7



figuur 8



figuur 9



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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 3379

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	DE-A-3 623 380 (KARL MENGELE & SÖHNE) * column 6, line 7 - column 9, line 6; figures 1,2 *	1,3-6,8, 10-13	A01D45/02
A	GB-A-2 012 153 (ALOIS POTTINGER) * page 4, line 15 - page 6, line 16; figures 1-10 *	1-6	
A	EP-A-0 099 527 (KEMPER) * page 4, line 14 - page 6, line 30; figures 1-3 *	1,2,4,6	
A	DE-A-4 002 344 (KARL MENGELE & SÖHNE) * column 3, line 38 - column 5, line 57; figures 1-3 *	1,2,4, 11,12	
A	DE-A-2 143 949 (JOURDAN) * page 11, paragraph 1 - page 12, paragraph 2; figures 4,5 *	1,8	
A	EP-A-0 253 125 (KARL MENGELE & SÖHNE) * column 1, line 50 - column 2, line 27; figures 1,2 *	1,11-13	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	FR-A-2 361 809 (SPERRY RAND) * page 3, line 32 - page 8, line 26; figures 1-4 *	1,8,11, 12	A01D
A	US-A-4 143 504 (NOACK ET AL.) * column 3, line 37 - column 4, line 62; figures 1-8 *	1,8,9	
A	FR-A-2 402 394 (VEB KOMBINAT FORTSCHRITT) * page 3, line 25 - page 4, line 33; claim 3; figures 1-3 *	8,9	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01 FEBRUARY 1993	Examiner WILLIAMS M.J.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document			

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-2 012 154 (ALOIS POTTINGER) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
The present search report has been drawn up for all claims			
Place of search THE HAGUE	Date of completion of the search 01 FEBRUARY 1993	Examiner WILLIAMS M.J.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ***** & : member of the same patent family, corresponding document	

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